

Baking Process Performance Data for 3M™ Polycarbonate Carrier 3000 & 3M™ High Shear PSA Cover Tape 2668

Introduction

3M™ Polycarbonate Carrier 3000 and 3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 help enable semiconductor and electronics manufacturers to seal electrical and electronic components into the carrier tape using a baking process. This process helps protect moisture sensitive devices during transport.

This technical brief summarizes the effects of a 125°C baking process on the performance of 3M™ Polycarbonate Carrier 3000 and 3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 in this process.

Detailed information about each individual 3M product's specifications and properties is available in that product's Technical Data Sheet. To discuss a specific application, please reach out to a 3M Sales Representative or Application Development Engineer.

Testing Process

3M™ Polycarbonate Carrier 3000 is an embossed, heat-resistant, polycarbonate carrier tape used in transport tape and reel applications. 3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 is a transparent, static-dissipative, polyester film cover tape.

3M applied 3M 2668 PSA cover tape to 3M carrier 3000 through a standard process involving applying adequate pressure to the non-adhesive surface of the cover tape over the adhesive stripes with a reciprocating shoe or other compliant roller mechanism. This provides proper initial adhesion. Experimental parameters included:

- Cover tape: 3M™ Pressure Sensitive Cover Tape 2668, 9.3 mm
- Carrier tape: 3M™ Polycarbonate Carrier 3000, 12 m
- Sealing model: Reciprocating
- Pressure: 1.0 bar
- Speed/Dwell time: 100 ms
- Temperature: Room temperature $\approx 23^{\circ}\text{C}$ (73°F)

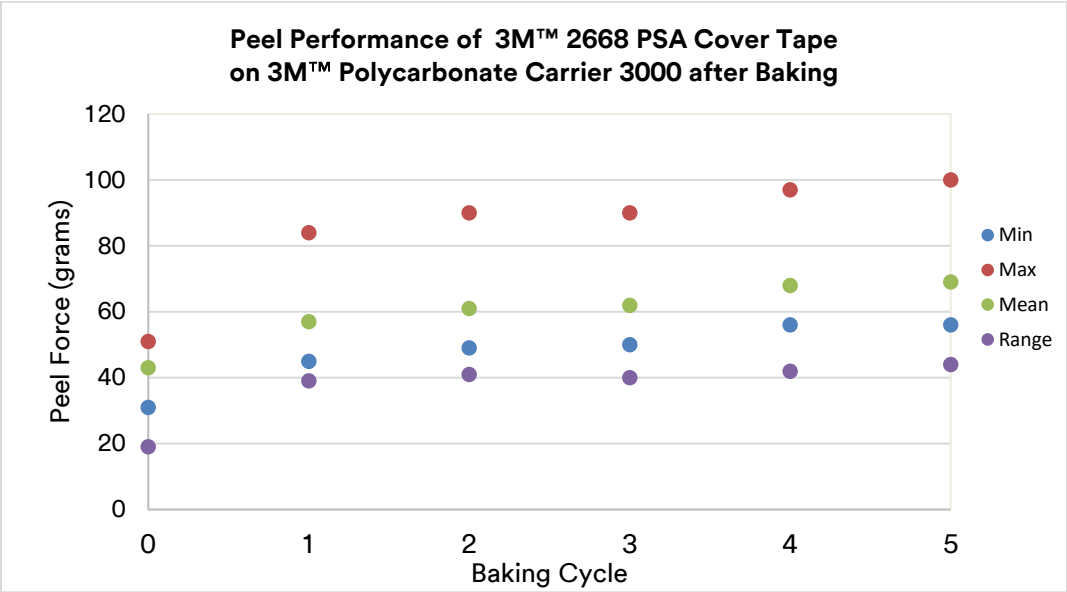
Then, 3M baked the combined tape and cover tape for 5 cycles, each 24 hours long, at 125°C, and analyzed the results in eight areas:

- Removal Force + Residue
- 3M™ Polycarbonate Carrier 3000 Critical Dimension Variation
- 3M™ Polycarbonate Carrier 3000 Surface Resistance Performance
- 3M™ 2668 High Shear Pressure Sensitive (PSA) Cover Tape Performance
- 3M™ 2668 High Shear Pressure Sensitive (PSA) Cover Tape Camber Performance
- 3M™ 2668 High Shear Pressure Sensitive (PSA) Cover Tape Surface Resistance Performance
- 3M™ 2668 High Shear Pressure Sensitive (PSA) Cover Tape Optical Performance
- Other Visual Observations of 3M™ 2668 High Shear Pressure Sensitive (PSA) Cover Tape

30 tests were conducted to provide a statistical sample.

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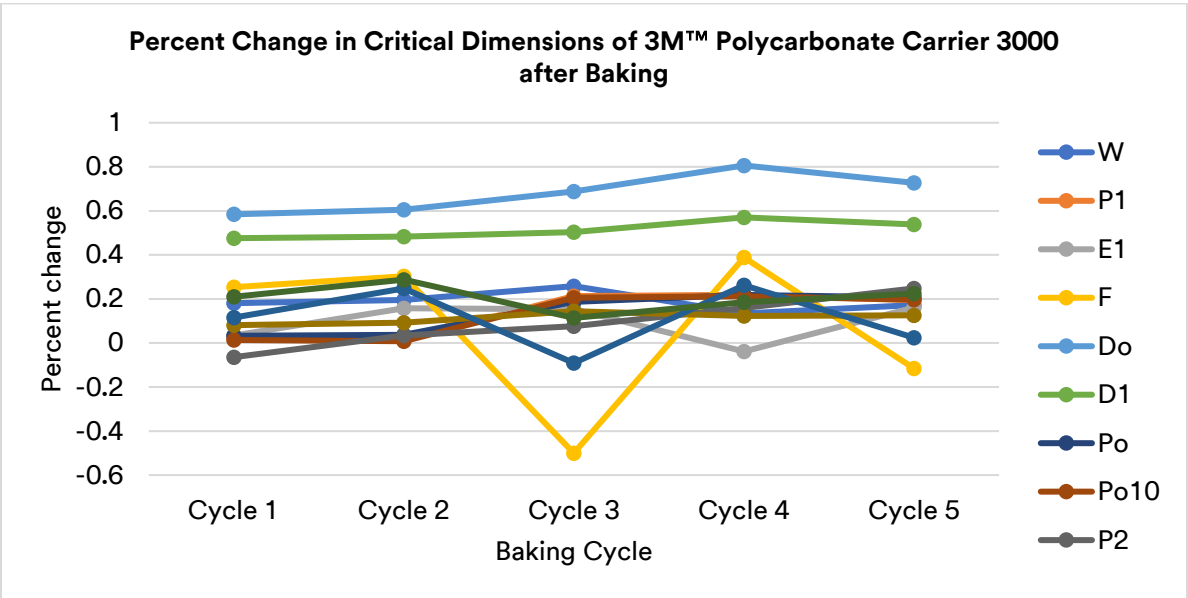
Removal Force + Residue



Key Observations

- Removal force was typically 20 to 30 grams higher after baking. Specific removal force needed will depend on the carrier tape and cover tape width, the general sealing condition before baking and other variables related to the seal surfaces.
- No adhesive transfer or residue was observed on the carrier tape after the cover tape was peeled off.
- Peel range variation (min to max) increases due to the shrinkage and elongation in the polyester backing material of 3M PSA cover tape 2668.

3M™ Polycarbonate Carrier 3000 Critical Dimension Variation

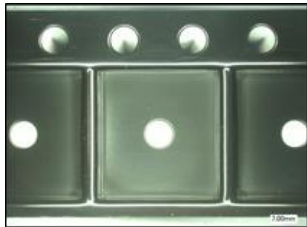


Note: Based on 30 sets of statistical data, units: mm

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Key Observations

- No severe product deformation or severe sign of product shrinkage was observed on 3M™ Polycarbonate Carrier 3000.
- The critical dimensions of 3M™ Polycarbonate Carrier 3000 exhibited change of less than 0.1% for Po10. The above table shows minor variations in other critical dimensions, but no significant dimension changes.
- Visual observation (below) showed no notable differences.

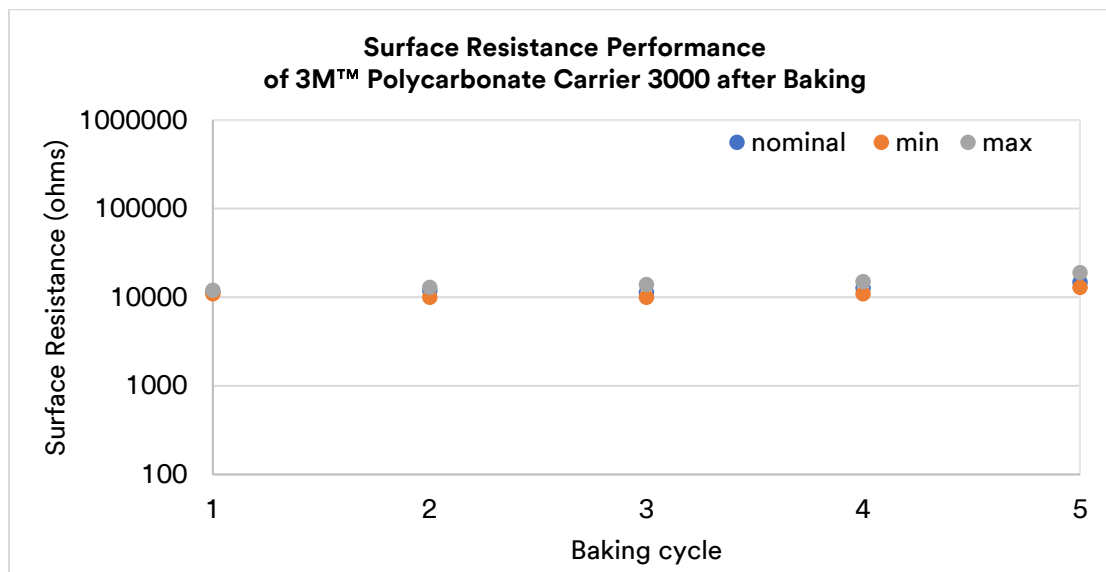


Before baking



After 5 cycles of baking

3M™ Polycarbonate Carrier 3000 Surface Resistance Performance

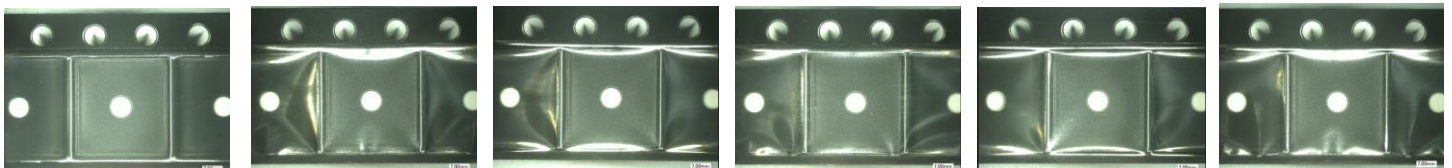


Key Observations

- No change was observed in the surface resistance of the carrier tape

3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 Performance

Key attributes such as visual or optical performance, surface resistance, and camber performance were verified before and after the baking test.



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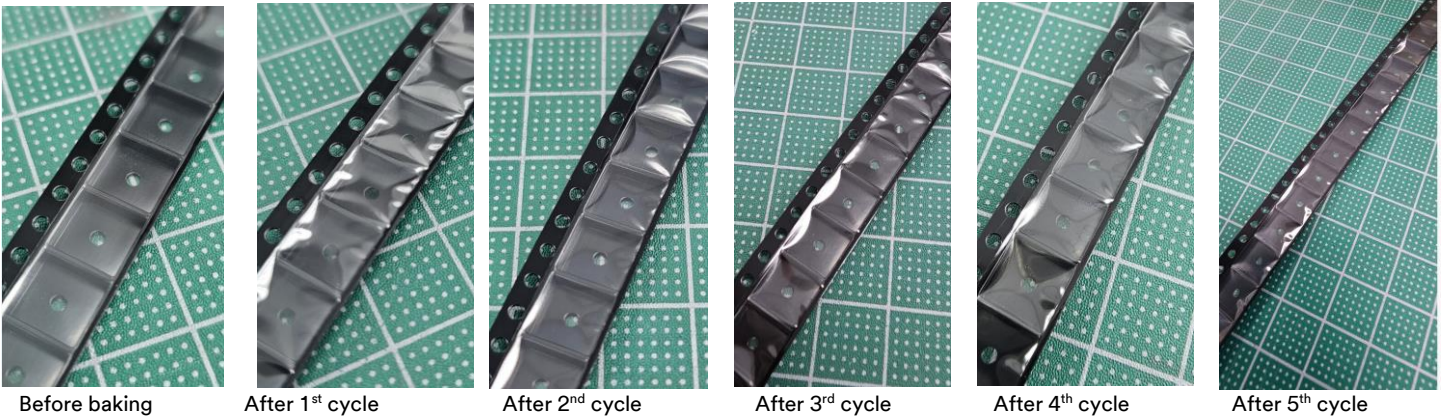


Photo of visual inspection of PSA cover tape after baking at 125°C

Key Observations

- 3M™ PSA cover tape 2668 exhibited visual signs of shrinkage after the 1st baking cycle at 125°C.

3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 Camber Performance

	Initial	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
Camber	0.142 mm	3.271 mm	3.228 mm	3.853 mm	3.967 mm	4.228 mm

Camber measurement performed using 3M test method, on a sealed sample

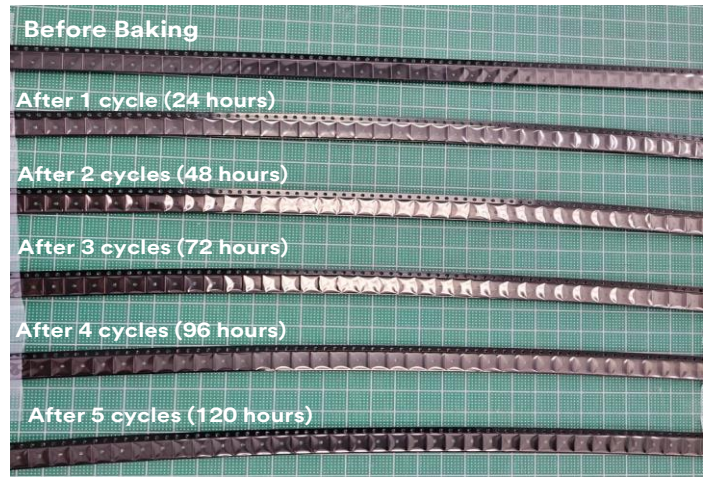


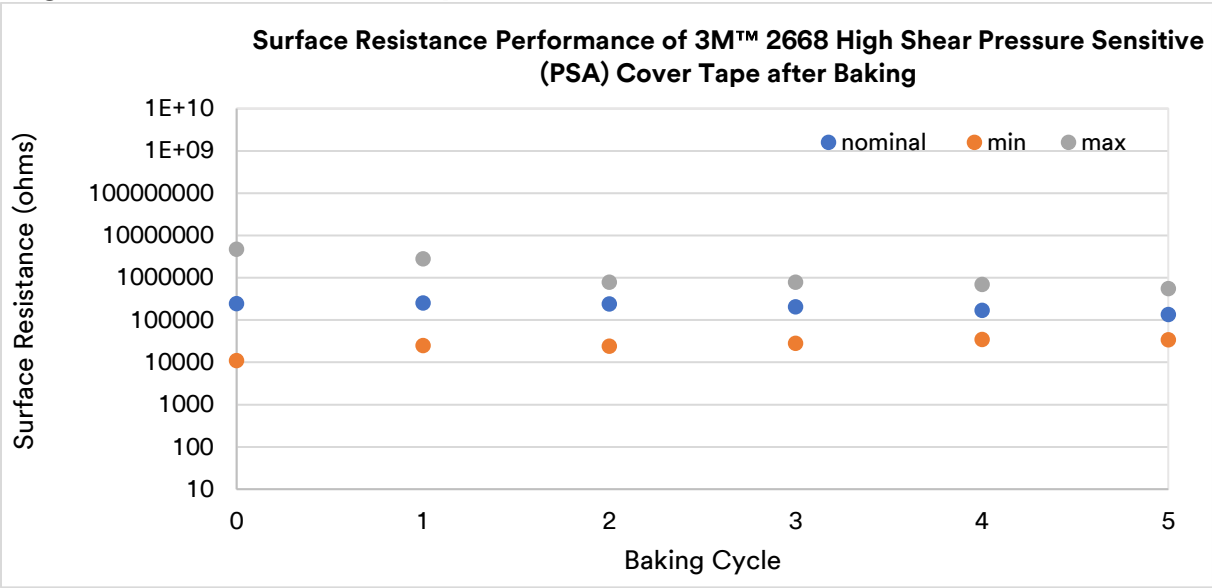
Photo of sealed sample after baking

Key Observations

- More than 2/250 mm camber was exhibited after the first cycle

3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 Surface Resistance Performance

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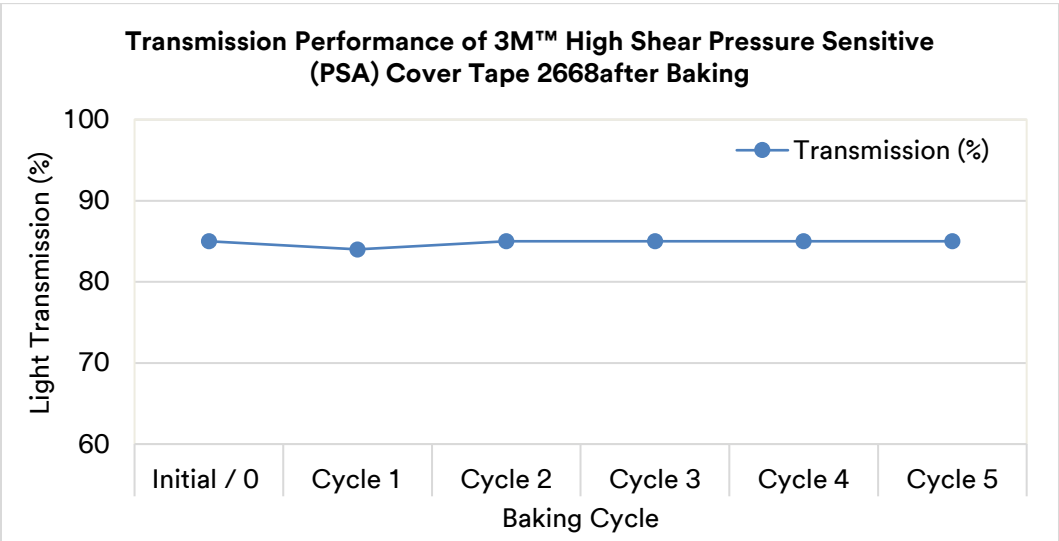


- Units: Ohms
- Surface resistance measured using Prostat Resistance Meter 801, 922B 2-point probe
- Specification 1.0E+04 – 1.0E+010 ohms

Key Observations

- No change observed in the surface resistance of 3M 2668 PSA cover tape after baking.

3M™ High Shear Pressure Sensitive (PSA) Cover Tape 2668 Optical Performance



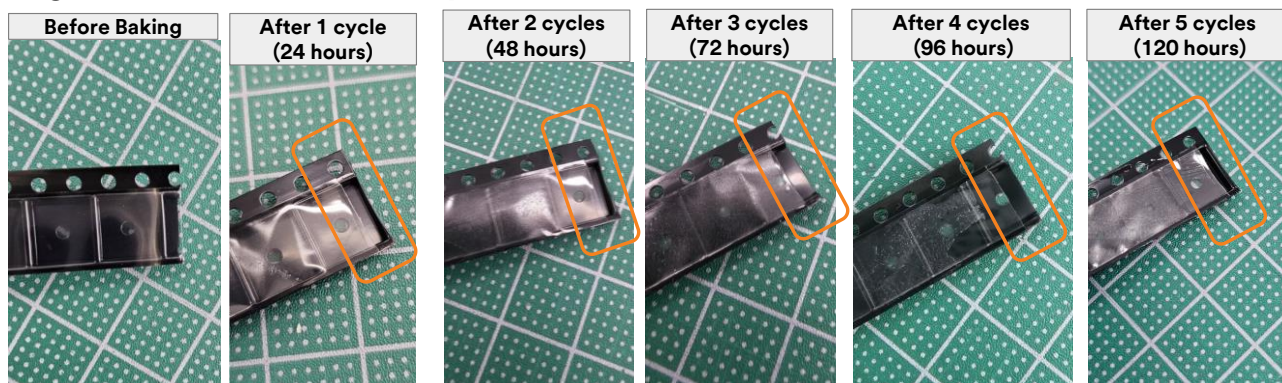
- Units: %
- Measurement equipment: Gregta Macbeth D200 Densitometer
- Specification: 75 – 85%

Key Observations

- 3M 2668 PSA cover tape transmission performance remained unchanged after baking.

Other Visual Observations of 3M PSA cover tape 2668 after Baking

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Note: Photos highlight the cover tape shrinkage after each baking cycle

Key Observations

- 3MPSA cover tape 2668 experiences 1-3mm in length from each end of the sealed product carrier tape. This is normal and should not affect performance or protection of the cover tape since it occurs at the leader or trailer of the whole reel.

Summary

Overall, this baking test illustrates that:

- Dimensional stability is maintained for 3M™ Polycarbonate Carrier 3000. Minor (within normal bounds and with little to no effect on performance) shrinkage takes place on the leading and trailing ends of 3MPSA cover tape.
- Both tapes demonstrated stable surface resistance.
- No cover tape delamination took place.
- Cover tape clarity remains unchanged.

In addition, note that the synthetic adhesive used in the construction of 3M™ High Sheer Pressure Sensitive Cover Tape 2668 has been engineered to provide long term resistance to thermal degradation, even when exposed to environmental extremes such as the storage conditions depicted in the charts in this publication. Follow the storage and shelf life guidelines included in the product Technical Data Sheets.

Please reach out to a 3M Sales Representative or Application Development Engineer with any further questions.

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